Los Alamos
NATIONAL LABORATORY
Los Alamos, New Mexico 87545

A US Department of Energy Laboratory

For the Seventh Generation

Environment, Safety, and Health at Los Alamos National Laboratory: A Report to Our Communities 1997–1998 Volume II

For the Seventh Generation

And each generation was to raise its chiefs and to look out
for the welfare of the seventh generation to come.

We were to understand the principles
of living together.

We were to protect the life that surrounds us.

We were to give what we had to the elders and to the children.

What of the rights of the natural world?

Who is speaking for the waters of the earth?

Who is speaking for the trees and the forests?

Who is speaking for our children?

We must stand for these people, and the natural world
and its rights; and also for the generations to come.

Poem based on a statement by Oren Lyons, Iroquois, which appears in
Look to the Mountain—An Ecology of Indigenous Education
by Gregory Cajete, Ph.D., Santa Clara Pueblo.

The indigenous people of North America lived in harmony with the natural environment, protecting and conserving it so their way of life would be indefinitely sustainable. Every decision was examined for its long-term implications, not just for the tribe's children and grandchildren, but for the seventh generation to come. This philosophy is common amongst the Pueblo Nations of our region and is also to be found in the Great Law of the Iroquois Confederacy.

Letter from Laboratory Director John C. Browne

Welcome to the Laboratory's second annual report to our communities on our progress in environment, safety, and health. The stories in this issue present an overview of selected topics in this area and will also introduce you to some of the dedicated men and women who do the work. We hope you will find this report useful and interesting.

The goal of the Laboratory's safety culture, a product of our integrated safety management system, is to ensure that we injure neither people nor the environment as we carry out our science and technology mission. Integrated safety management also helps us to meet all laws and regulatory requirements and to have a safer and more environmentally acceptable workplace.

We are also learning from the experience of world-class organizations known for high productivity and outstanding safety and environmental records. In particular, I have asked the Laboratory to adopt the DuPont Corporation's intertwined goals, called the Five Zeros: zero injuries or illnesses on the job, zero injuries or illnesses off the job, zero environmental incidents, zero ethics incidents, and zero people mistreatment incidents. Our ability to achieve an injury-free workplace and to protect the environment requires the personal dedication of us all, and we will rise to this challenge.

I am personally focusing on improving our community relationships. I have visited all the local communities and Pueblos to identify areas of mutual interest for further development and to repeat my promise that we will communicate with honesty and candor. Open communication is an essential part of earning the trust of our neighbors.

In the course of these visits, I have been asked if I will honor the safety and environmental commitments made by my predecessor. The answer is "yes." I have already signed an extension of the Cooperative Agreements between the Lab and four nearby Pueblos and we are continuing the series of community environmental meetings that were started last year. I believe that our Laboratory must be a reliable neighbor and worthy of your trust.

Finally, this report was prepared for you. Please let us know how we can make it more responsive to your needs by filling out and returning the enclosed comment card.

John C. Browne

Contents

Progress in Safety and Health 3

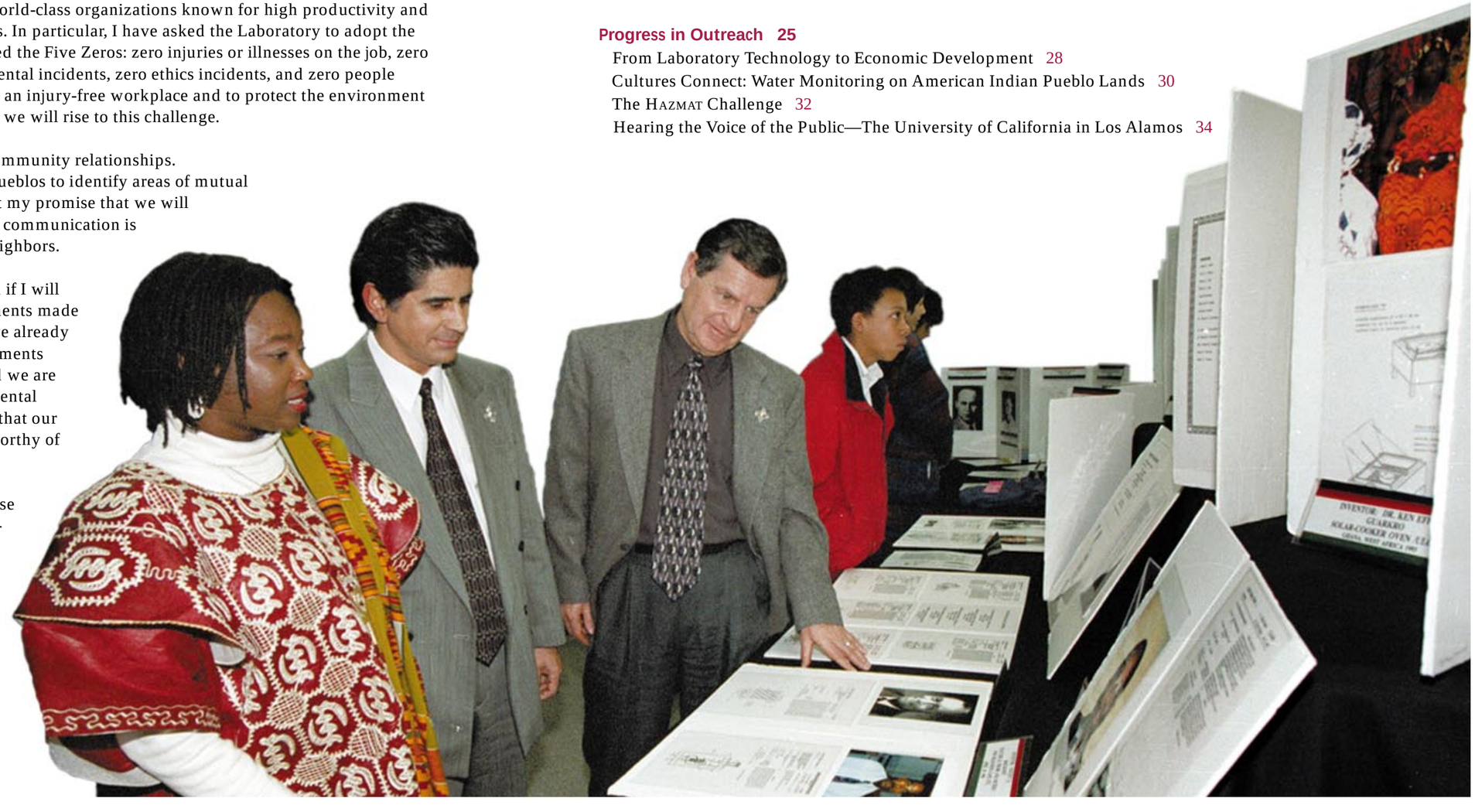
A Tale of Two Facilities 6
If You Could Change Something, What Would It Be? *No Accidents! No Injuries*! 7
Worker Electrical Safety—New Times, New Challenges 8
Earthquakes Close to Home 10
A Progress Report on Los Alamos County Cancer Investigations 12

Progress in Environmental Safety 15

The Mexican Spotted Owl—To Find and Protect 18
What Are We Eating? 20
There's Tritium in the Aquifer? 22

Progress in Outreach 25

From Laboratory Technology to Economic Development 28
Cultures Connect: Water Monitoring on American Indian Pueblo Lands 30
The HAZMAT Challenge 32
Hearing the Voice of the Public—The University of California in Los Alamos 34



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Los Alamos National Laboratory was established in 1943 as Project Y of the Manhattan Engineer District. Under the leadership of J. Robert Oppenheimer, the Laboratory developed the world's first atomic bomb. Today, Los Alamos is a multidisciplinary, multiprogram laboratory whose central mission still revolves around national security.

Managed by the University of California for the US Department of Energy, Los Alamos maintains a commitment to its tradition of free inquiry and debate, which is essential to any scientific undertaking. Located on the Pajarito Plateau about 35 miles northwest of Santa Fe, the capital of New Mexico, Los Alamos is one of 28 Department of Energy laboratories across the country.

The Laboratory covers more than 43 square miles of mesas and canyons in northern New Mexico. As the largest institution and the largest employer in the area, the Laboratory has approximately 6800 University of California employees plus approximately 2800 contractor personnel. Our annual budget is approximately $1.2 billion.

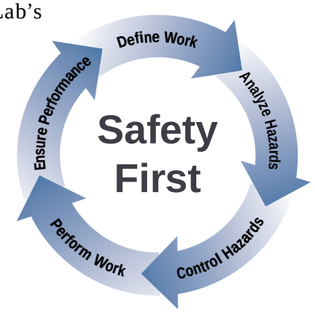
Progress in Safety and Health

Our goal is to accomplish our mission cost-effectively while striving for an injury-free workplace. . . .

—Commitment to environment, safety, and health
Los Alamos National Laboratory

For over two years, Los Alamos National Laboratory, which is operated by the University of California for the US Department of Energy, has been developing an integrated safety management system as a better means to help prevent accidents, to ensure that our workers are safe, and to eliminate adverse health and environmental issues.

We have instituted many practices that support safety awareness. At the core of our Lab's approach to safety and to help workers avoid accidents, the integrated safety management system offers the simple five-step process shown at the right, which reminds workers of the best approach to working safely.



One example of a new safety-related practice is that our managers participate in management workplace walk-arounds. In a walk-around, the manager visits, watches, and asks workers questions. The walk-around helps the manager and worker identify deficiencies and exemplary practices on the spot and record them for appropriate followup.

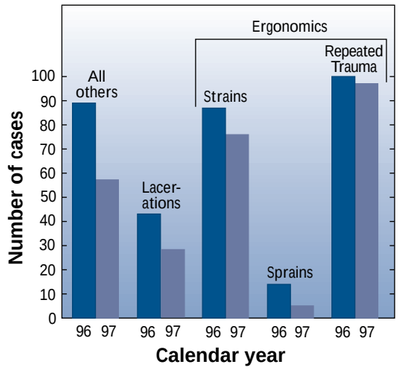
Another example is that the Lab now holds annual "Safety Days." This program encourages each employee to review the five-step process, analyze safety concerns within the workplace, and learn lessons from incidents and accidents that have actually occurred.

Front left to right: Phil Romero, Environment, Safety, and Health Division, and Eddie Esquibel, Johnson Controls Northern New Mexico, conduct a class in crane hoisting and rigging safety.

A monthly On-the-Job Injury and Illness Report distributed Lab-wide presents our record in safety and health. The report data cover work-related injuries and illnesses as required by the Occupational Safety and Health Act. In 1997, we reported a total of 329 such injuries and illnesses. This annual rate for our University of California workers of 4.37 injuries and illnesses per 100 workers is slightly lower than our 1996 rate of 4.52. According to the most recently available survey by the Bureau of Labor Statistics, during 1996, US private industry workplaces had a rate of 7.4 injuries and illnesses per 100 workers.

The chart at the upper right shows work-related injuries and illnesses reported in 1996 and 1997, including ergonomic injuries and repetitive motion disorders. Because ergonomic injuries and illnesses significantly contribute to our work-related injuries and illnesses record, in late 1997, we began an awareness campaign and

1996 and 1997 top injuries and illnesses



provided tools and training about these injuries and preventive measures as part of a wider goal of a safer, healthier workplace.

Environment, safety, and health (ES&H) performance report card

The Lab's performance in ES&H can be evaluated in a number of ways. Some of them are as straight forward as collecting data about work-related injuries and illnesses; others are more subtle and involve complex analyses based on specific performance measures of technical operations.

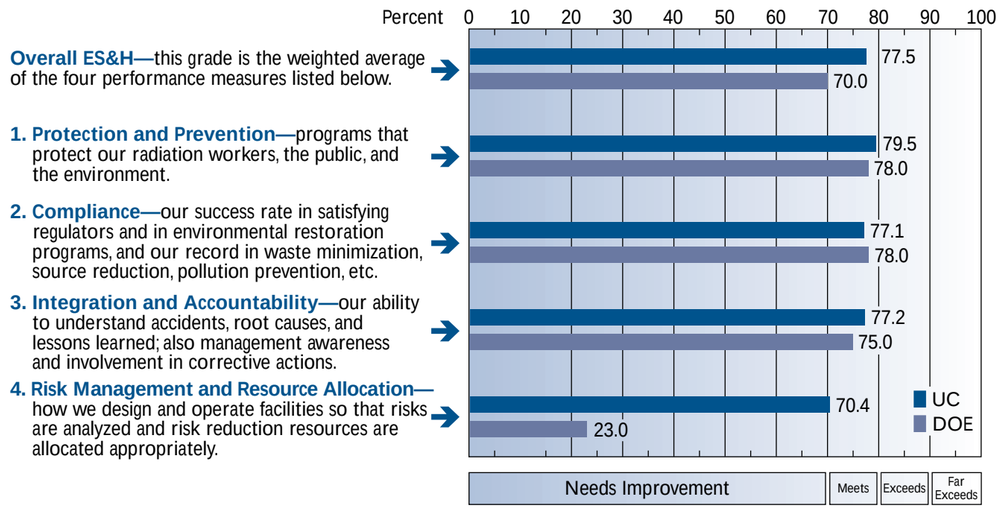
Meeting challenges presented by ES&H performance measures specified by our contract with the Department of Energy is one of our top priorities. Scores by both the University of California and the Department of Energy given in the form of percentages determine if we need improvement or if we meet, exceed, or far exceed expectations (see report card on previous page).

In all but one category of these performance measures, we posted better scores in 1997 than in 1996 and achieved percentages at the top of the range for "meets expectations." We find these scores rewarding because each year we work with the Department of Energy and continue to "raise the bar."

In the fourth performance measure category, Risk Management and Resource Allocation, our score from the Department of Energy dropped from 82% to 23%, indicating a need for improvement. This measure covers a formal process we use to ensure our facility safety systems, such as ventilation and fire systems, meet requirements. The Department of Energy's rigor concerning these systems led them to the conclusion that our Laboratory needed to make some major improvements—thus, the low score.

In response to the Department of Energy's evaluation, we have implemented substantial improvements relating to our safety systems. To ensure we meet the expectations that we, the Department, and the University of California have regarding the safe operation of our facilities, we have assigned a special team of Laboratory experts to review our facility safety systems. The team works closely with the Department of Energy and the facility to ensure that our safety systems meet all requirements of the work being done within the facility.

1997 ES&H report card for Los Alamos National Laboratory



More about safety and health

One of the challenges of our institution is managing the wide range of safety and health risks in our workplace.

In a Tale of Two Facilities, we briefly explain how we respond to safety at our facilities. In another article, we explain how Johnson Controls Northern New Mexico, a major contractor at our Laboratory, has been working hard at improving its safety record.

In the pages that follow, an article on worker electrical safety helps explain how we deal with a hazard that is present every day. Earthquake risk is the topic of an article that answers some questions about an event that may occur only once in thousands of years.

In response to public interest in health issues related to Laboratory operations, we invited Charles Mack Sewell, New Mexico State Epidemiologist, to report on progress in Los Alamos cancer investigations. His article provides a concise review of the results from studies going back to 1970.

A Tale of Two Facilities

"When the work stopped, our people knew it was time for a change. Everybody did whatever it took to bring the facility back to normal operations. We found no resistance at all to the process of developing a more comprehensive safety culture."

—Dave Post, Deputy Director, Nuclear Materials Technology Division

Ensuring that the nation's nuclear stockpile is safe, reliable, and secure—without conducting underground tests—requires sophisticated experimental facilities for scientists to study aging effects, materials behavior, basic physics, and engineering problems. Two facilities that are part of this important Laboratory mission give examples of the serious way we deal with safety-related issues. In 1997, each facility stopped work because of safety problems.

The Dual-Axis Radiographic Hydrotest Facility is currently under construction—it will be fully operational in about five years.

In 1997, Lab officials ordered the project to stand down after a contract worker brought safety deficiencies to their attention. Officials found 8 serious hazards and 25 other-than-serious deficiencies. The stand-down of the facility affected 60 employees. Before they returned to work, the contractor for the project had to correct deficiencies and develop an action plan approved by the Laboratory that ensures that such deficiencies will not happen again.

Dual-Axis Radiographic Hydrotest Facility

Chemistry and Metallurgy Research Building

The Chemistry and Metallurgy Research building is an aging facility. It was built in 1956 and is currently undergoing a $176 million upgrade. In November 1996, an explosion and fire in the building made newspaper headlines. Fortunately, no one was hurt, but the event led to an investigation that uncovered a pattern of not following safety procedures. When the building was shut down in September 1997, 350 workers were affected, although no layoffs occurred.

Before starting work again, workers had to review their safety systems, reassess hazards, take training, and upgrade all operations. In April 1998, the Laboratory announced that the facility was once again 100% operational.

Dave Post, deputy director of the Nuclear Materials Technology Division, said, "When the work stopped, our people knew it was time for a change. Everybody did whatever it took to bring the facility back to normal operations. We found no resistance at all to the process of developing a more comprehensive safety culture."

If You Could Change Something, What Would It Be?
No Accidents! No Injuries!

With these simple words, Johnson Controls Northern New Mexico (Johnson North), a Lab contractor, set out to improve its safety record. According to John McNeel, Johnson North spokesperson, "We are honestly committed to an environment where no injuries and no accidents occur."

Setting a goal was just the beginning. The secret to Johnson North's growing success lies in how it integrates its safety approach to achieve that goal. First, the company expects individual employees to commit to safety values and to make plans, take actions, base decisions, and perform according to those values. In turn, the company is committed to supporting a workplace where values support safety and good morale is important. At the management level, Johnson North intends to provide the best organizational structures, procedures, and performance measures for the worker.

Johnson North started its safety campaign by asking for help. JMJ Associates, a consulting firm, provided training in high-performance safety. Its purpose was to help Johnson North fulfill a mission of eliminating injuries on all job sites and to use personal leadership to achieve the following safety objectives:

- Deepen each individual's commitment to an incident- and injury-free project,
- Develop a deeper personal integration of the project's values and mission,
- Expand the commitment to personal mastery as a supervisor, and
- Establish a companywide commitment to using critical success factors.

Above: The Utilities Department's Water, Gas, and Wastewater Branch employees, who worked for two years without a lost-time injury, wear safety jackets given them as a reward. Inset: Utilities Department Manager, Robert Greuter; Water, Gas and Wastewater Manager, John Stump; and Pipe Fitter Steward, Juan Rivera show off the safety jacket's custom design.

Worker Electrical Safety—New Times, New Challenges

At home and on the job, electricity is a part of life. It is so common that we normally use electricity without giving much thought to its potential hazards.

In 1996, two Laboratory employees were seriously injured in electrical accidents that occurred during their routine work. Naturally, the first reaction to these events was deep concern for the injured. Following immediately from this response, however, was a look at our Laboratory's electrical safety program and its effectiveness. As a result, we began a revised electrical safety program in January 1997. The new program dedicates more resources to preventing electrical accidents and promoting safe electrical work.

In part, the vitality found in our new program may be credited to a group of approximately 80 people—the electrical safety officers who inspect electrical equipment, provide expert advice, and oversee electrical safety. As part of their assignments, they also help ensure that standard procedures and work permits address electrical hazards. Electrical safety officers even inspect "unlisted" equipment—equipment specially built by Lab scientists for their research projects.

Diana Lindstrom is one such officer, an electrical engineer dedicated to her work and to the safety of the workers she supports. Diana oversees electrical safety for Johnson Controls Northern New Mexico (Johnson North). In this capacity, she chairs Johnson North's Electrical Safety Committee and represents Johnson North on the Laboratory's Electrical Safety Committee.

She enjoys her work because as problems are identified, they are brought to committee meetings, where Diana and her colleagues tackle them and give workers safer ways to handle electrical work.

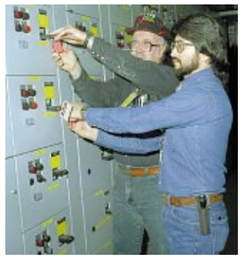
Diana knows many of the workers she supports and she doesn't see safety as an abstract issue. "The best thing about my job is knowing that I'm helping keep people from harm," she says. Mutual respect exists between Diana and the electricians, who she says "are true professionals and great to work with."

Another part of the Lab's electrical safety program is a new training program, which more than 300 electricians and 3000 general workers have already taken. The training helps to raise electrical safety awareness and contributes towards creating a safer workplace.

To further support safe work with electricity, the Laboratory now provides workers with a detailed list of electrical hazards by category. From a simple chart, workers can easily find the level of hazard they face. Workers then know what they must do under different conditions, such as use the two-person rule and standard operating procedures, obtain work permits, and request inspections.

Our Laboratory continues to meet new challenges that arise. Our electrical safety program provides one example of the kinds of solutions we seek and how we back those solutions with resources to achieve our safety goals.

Diana Lindstrom (right rear) participates in the Lab's Electrical Safety Committee, a gathering of representatives from electrical groups who meet biweekly to discuss electrical safety concerns.



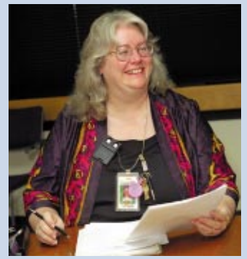
Photos from top to bottom:

Earl Fichtner and Ray Montoya, both members of the International Brotherhood of Electrical Workers (IBEW), perform lockout/tagout procedures on a motor control center. The purpose of the procedure is control of the hazardous energy source, which in this case is electricity.

Diana Lindstrom, an electrical safety officer, reviews electrical safety concerns with electrician Ray Montoya.

Randy Torres, Gary Martinez, and Patricia Griego, of the IBEW, take voltage and amperage readings as part of routine preventive maintenance.

Diana Lindstrom is 100% committed to worker safety—and with over 15 years' training and experience in electrical engineering work, she knows what she's talking about!



Raised in Portales, New Mexico, Diana graduated from Portales High School and began studies in applied music. Abandoning music after two semesters—but maintaining her pleasure in playing the flute, violin, oboe, and other instruments—she joined the Navy to see the world. After the Navy stationed her everywhere from Orlando, Florida, to Keflavik Iceland, she began to miss the Southwest and New Mexico. Still, she took some 10 years to return to her home state. During these years, she earned a Bachelor of Science in electrical engineering from San Diego State University and gained valuable experience.

In 1995, Diana signed on with Johnson North (then Johnson Controls), as a senior electrical engineer. In 1997, she was appointed the Johnson North electrical safety officer, a job that combines her engineering skills and commitment to electrical safety.

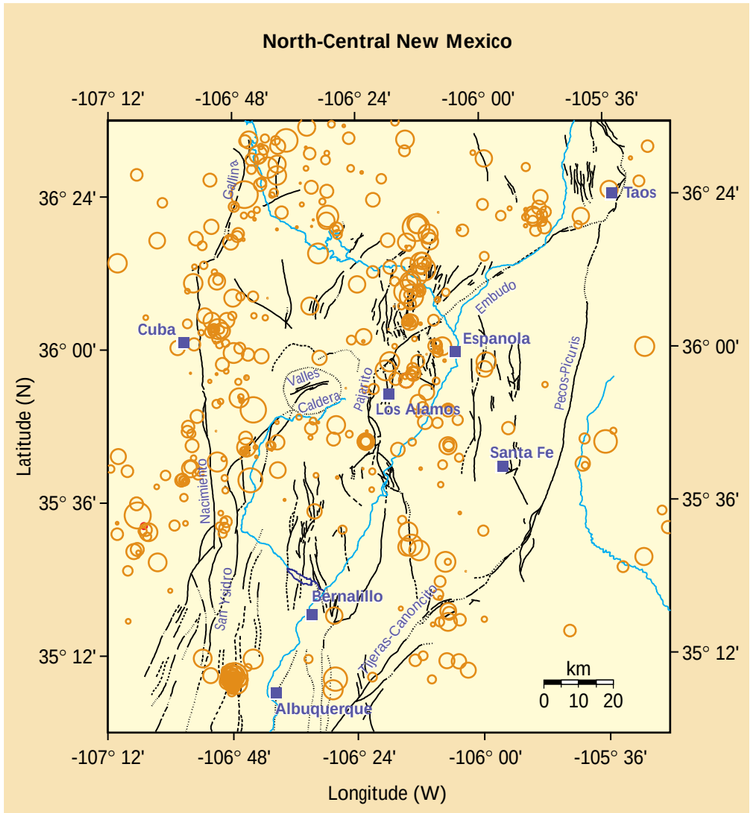
Another of Diana's commitments is to make the Laboratory more accessible to disabled individuals. In 1996, she was told that she has post-polio syndrome, the result of surviving polio as an infant. To continue to do her work, she uses an electric scooter-type wheelchair. John C. Browne's commitment to diversity and safety, she believes, is helping the Lab to consider the safety needs of those with disabilities.

Whether she's pressing for disability issues awareness or representing Johnson North on the Laboratory's Electrical Safety Committee, there can be no question that Diana is a dedicated safety advocate.

Earthquakes Close to Home

Most people who live in north-central New Mexico are unaware of earth quakes that occur in the region. Studies by Laboratory scientists reveal the reason. Over the past 25 years, only a few earthquakes have been large enough to be felt. The largest recorded was about a magnitude 3. An earthquake of this size would generally only be noticed by people who are indoors, and it might feel like the vibration of a passing truck rumbling by. In addition, the earthquake would have to occur nearby to be felt at all.

Northern New Mexico geology contains rifts and faults, the largest rift being the Rio Grande rift, which extends from Colorado through New Mexico and into Mexico. This rift runs through Los Alamos, Espanola, and Santa Fe and is spreading apart at the rate of about 0.01 millimeters per year.



This illustration shows faults (black lines) and earthquakes (orange circles). The quakes were located from nearly 25 years of monitoring by the Lab. The size of each circle is proportional to the magnitude of each earthquake—the largest has a magnitude of about 3. The Rio Grande rift is a major geologic feature of New Mexico, and roughly follows the Rio Grande itself (the blue line) from near Taos in the north to Albuquerque in the south.

A team of Los Alamos scientists who are part of the Los Alamos Seismic Hazards Program is studying the quakes that have occurred in our area. Their purpose is to understand the hazards that earthquakes pose to the Laboratory and nearby communities. "Through a network of seven seismographs set up near the Laboratory, we are able to monitor earthquake activity," says seismologist Leigh House; "so far, our instruments have recorded more than 2000 earthquakes." The sensitivity of the instruments allows them to detect quakes below a magnitude that we can feel. This is why many of us are surprised that so many earthquakes have been recorded.

Leigh House examines the recording equipment at a seismograph station. Seven such stations are set up around the Laboratory to detect earthquake activity.

"One of our goals is to learn more about how often and where earthquakes occur in our area," says House. The occurrence of past quakes is examined in two time frames: (1) the history of 80 years of seismographic activity since the invention of recording instruments and (2) the history of earthquakes that were large enough to have been felt before recording instruments were available. The team can map where and when activity has occurred to look for patterns and trends.

Also, an examination of sediment layers that have been exposed with trenches can give clues about earthquake activity from the distant past. Geological studies show that earthquakes as large as a magnitude 7 have occurred in New Mexico. Although an earthquake of that size could occur in the region, thousands of years may go by before one does. Studying the large quakes of the ancient past and the many small ones that occur each year helps our Lab to understand how they happen and what we can do to prepare for them.

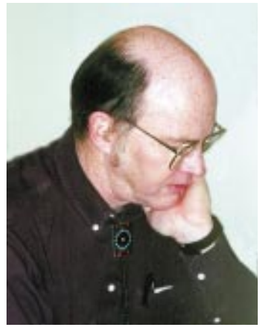
Earthquake safety and Lab nuclear facilities—The Los Alamos Seismic Hazards Program helps focus attention on ensuring that Laboratory facilities are designed to adequately withstand earthquakes. In a recent study, the Department of Energy looked at natural hazards that exist at its major sites. To deal with these hazards, the Department established a set of varying design requirements that are based upon a facility's use.

According to design requirements, standard industrial facilities should be able to protect occupants and continue functioning when subjected to an earthquake of a size that may occur once in several hundred years. However, facilities that handle nuclear materials must further keep nuclear and other hazardous materials contained when subjected to an earthquake so large that it may occur only once in a few thousand years.

Scientists at Los Alamos facilities, such as the Plutonium facility and the Chemistry and Metallurgy Research building, handle radioactive materials. The Plutonium facility was constructed in the early 1970s to withstand greater ground motion than any previous Laboratory facility. Although much has been learned about earthquake engineering since then, the Plutonium facility satisfies the level of earthquake resistance that the Department of Energy would require if it were to be built today. The Chemistry and Metallurgy Research building is older and is being reviewed for its ability to withstand ground motions. The review considers the feasibility of retrofitting the building—that is to provide the building with features not included in the original design. The purpose of retrofitting would be to improve building resistance to ground motions.

A Progress Report on Los Alamos County Cancer Investigations

Charles Mack Sewell, Dr.PH., State Epidemiologist, New Mexico Department of Health



Charles Mack Sewell

In 1991, a Los Alamos resident generated a list of alleged recent brain cancer deaths among people who had lived in Los Alamos County. These allegations raised community concerns that Laboratory radioactive emissions or waste disposal practices might have caused an increased cancer rate in the county. In response, the Department of Energy funded the New Mexico Department of Health to conduct a comprehensive review of cancer incidence in Los Alamos County. Fortunately, New Mexico has the New Mexico Tumor Registry, 1 of 11 population-based tumor registries in the country. The Registry had over 20 years of cancer incidence data available for analysis.

To guide the study of cancer rates, the New Mexico Department of Health named a 13-person steering committee made up of local residents, Laboratory representatives, local and out-of-state public health professionals, and representatives of federal health agencies. The committee held its first public meeting in December 1991. At this time, it heard from local and national experts in cancer-cluster investigations and environmental radiation exposures as well as citizens and groups concerned about nuclear safety. The committee continued to meet for five years as cancer rates were calculated for Los Alamos County and New Mexico. Its main objective was to compare Los Alamos County cancer incidence rates with rates for New Mexico and the United States to determine if Los Alamos rates were higher.

Results show that Los Alamos County had a modest elevation in brain and nervous system cancer during the mid-to-late 1980s (top figure)—70%–80% higher than seen in state and national comparison populations. However, because of the small number of cases, the study could not rule out random fluctuations as the cause of the higher rates in the county. (Note: The curves plotted in these graphs present a "rolling average"—the incidence rate plotted for 1986 is the average for the five-year period 1984–1988. The 1996 data are the Registry's most recent.)

The study also compared the incidence of brain and nervous system cancer within different neighborhoods of Los Alamos County with incidence rates for the county's five census tracts. All but 1 of the census tract rates were based on 3 or fewer cases; however, for the 11 years between 1980 and 1990, all census tract rates were higher than the state rates. The highest incidence of these cancers occurred in the tract that corresponds to Los Alamos' Western Area neighborhood. The Western Area incidence rate, which was based on three cases, was almost twice the rate of the next highest census tract. Again, however with such a small number of cases, chance alone could not be ruled out as causing the apparent increase seen in the Western Area.

A review of incidence rates for 22 other major cancers and childhood cancers showed the incidence of some cancers in Los Alamos County to be higher and some comparable or lower than those observed in the comparison populations. Cancers with incidence rates consistently elevated in Los Alamos County during 1970–1990 included melanoma of the skin, prostate cancer, non-Hodgkin's lymphoma, ovarian cancer, and female breast cancer. The incidence of other types of cancers—leukemia and major cancers of the respiratory and digestive systems—was comparable or lower.

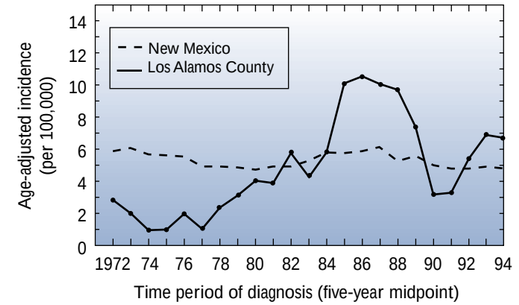
Several cancers showed patterns of increasing incidence during specific time periods. For example, thyroid cancer incidence increased markedly in the mid-1980s. Between 1986 and 1990, the Los Alamos County rate was nearly four times higher than for the rest of New Mexico (bottom figure). When these findings emerged, the Department of Energy undertook additional studies of thyroid cancer.

One thyroid cancer study showed that between 1970 and the mid-1980s, incidence rates in Los Alamos County fluctuated slightly above the statewide rate. Then, during the late 1980s and early 1990s, Los Alamos rates rose fourfold to a statistically significant level. During 1988–1992, age-adjusted thyroid cancer incidence in Los Alamos County was 20.7 per 100,000 population compared with the state's cancer incidence of 4.5 per 100,000. New detection or diagnostic techniques used in the county did not explain the higher number of cases found in 1988–1992. The higher rate held briefly, then began to decline when fewer cases were diagnosed from 1994 to the present.

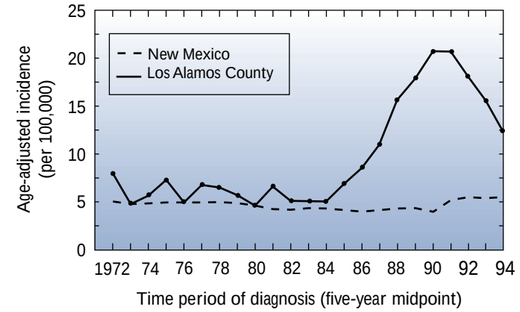
These studies do not identify a single cause of the unusually high number of thyroid cancers found in Los Alamos County in the 1988–1992 period. It is likely that there were many causes, some reviewed in the investigation and some that may never be identified. Typically, investigations of elevated cancer rates in other communities around the country report similar results.

The Tumor Registry has gathered additional surveillance data since the original investigations. These show a downward trend in the county's thyroid cancer rate and a decrease in the brain and nervous system cancer rate from the high point in the mid-1980s. The Department of Health and the New Mexico Tumor Registry will continue to monitor cancer rates in Los Alamos County and evaluate new information.

Five-year average annual incidence of brain and nervous system cancer: Los Alamos County and New Mexico



Five-year average annual incidence of thyroid cancer: Los Alamos County and New Mexico



As noted, the curves plotted in these graphs present a "rolling average"—the incidence rate plotted for 1986 is the average for the five-year period 1984–1988. The 1996 data are the Registry's most recent.

Progress in Environmental Safety

We affirm to our stakeholders, including our workforce, customers, and the public, that we conduct our activities with respect and care for the environment and for the safety and health of all.

—Commitment to environment, safety, and health
Los Alamos National Laboratory

Respect and care for the environment—it's a simple phrase that expresses an underlying principle behind many activities at our Laboratory. Some of these activities respond to our regulators—local, state, and federal agencies—whose job it is to see that we do our work responsibly. One of the primary recent shifts in our Laboratory's overall approach to regulator-related activities is an emerging higher operating ethic that goes beyond just compliance with numerical limits set by the law.

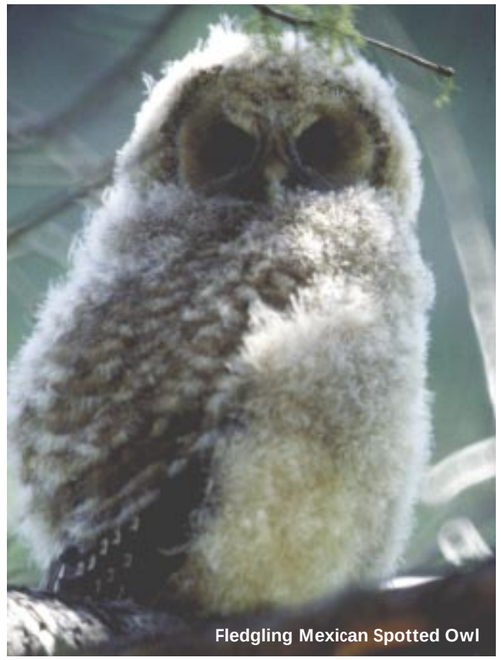
Water quality

Examples of how we apply higher standards are found, among other places, in the Laboratory's major water quality activities. These activities relate to the federal Clean Water Act, storm water permit activities, drinking water supply monitoring, and water quality surveillance of surface water, groundwater, and sediments.

During 1997, our Laboratory achieved 98%–99% compliance with National Pollutant Discharge Elimination System permit limits. Our goal is to significantly decrease the discharge of wastewater effluents and ultimately to move toward zero discharge. We reduced the number of outfalls—places where a drain or wastewater effluent discharges—from 141 to 33. We also upgraded our high-explosives wastewater treatment facilities, reducing their discharges from 12 million gallons to 130 thousand gallons per year. A 99% reduction in wastewater generation and improved treatment now result in only about 0.2% of the original organic pollutants being discharged to the environment. Ahead of us lies the task of completing upgrades to the remaining treatment facilities. In late 1998, our National

The Mexican Spotted Owl—To Find and Protect

Each individual species, whether plant or animal, is a thread that contributes to the fabric that makes up the natural environment. Proper environmental stewardship means paying attention to each individual thread.



Fledgling Mexican Spotted Owl

Imagine taking a stroll along the edge of one of the densely wooded canyons that cut through the Pajarito Plateau. Now imagine taking the same stroll in the predawn darkness with a flashlight. For David Keller, Laboratory biologist, and his crew, this predawn stroll is standard procedure every spring. They look for the endangered Mexican spotted owl.

When the owl was placed on the federal threatened and endangered species list in March 1993, the Endangered Species Act required annual searches and counts. So now the crew walks canyons known to be suitable habitat for the owl, playing a recorded owl call and listening for a response. Their work must be done before sunrise, the time when the owls, which are nocturnal, are most active and more likely to respond. In 1995, the crew's search was rewarded when they discovered a nesting pair and two owlets.

Keller's discovery initiated formal consultation with the US Fish and Wildlife Service, a regulator of the Endangered Species Act. As a Department of Energy Laboratory, we must ensure that proposed activities, such as new construction, do not jeopardize any threatened or endangered species. A biological assessment submitted to the Service helps determine if a proposed activity could have a bad effect on a particular species. If the answer is "yes," the Act requires a formal investigation and biological opinion from the Service. Should the effect not be considered adverse, the Service's agreement with the assessment is sufficient.

Keller's biological assessment includes measures to protect the spotted owl. Restrictions concern removal of mature trees, disturbance of habitat within one-quarter of a mile of a known nesting area, noise during the breeding season, personnel access off the mesa into the canyons, and lighting during nighttime operations. In August 1995, the Service agreed that Laboratory activities "were not likely to adversely affect" the owl.

In 1996 and again in 1997, the same pair of Mexican spotted owls returned to the same general vicinity and successfully raised a pair of owlets. Surveys for 1998 are eagerly anticipated because not only does Keller expect the return of the usual owl pair, but he also acknowledges the possibility of the return of one or both of the 1995 fledglings that are now old enough to breed.

Rocky Mountain Elk

Elk everywhere—Habitat management does not pertain only to threatened and endangered species. Such is the case with Rocky Mountain elk. The La Mesa fire of 1977 has resulted in more grassland, the preferred foraging ecosystem for elk. More grassland—along with the federally protected status of Lab and Bandelier lands—and the fact that some elk no longer migrate into the Jemez to bear young are resulting in an elk population redistribution in the eastern Jemez Mountains. Current estimates place the elk herd in this location as high as 1800 elk and expanding. Redistribution of the herd is creating problems within Lab boundaries, where fragile ecosystems and archeological sites are impacted by elk movements, on roadways where accidents are more likely, and outside Lab boundaries, where they forage on private property and cause damage. Also, elk are foraging more in areas close to sources of radionuclides, thereby raising the question of their ingesting contaminants and transporting them off-site.

Solving the problems of an expanding elk population is not simple and can only be accomplished after baseline information has been collected. Laboratory biologists are using special state-of-the-art elk collars that track elk via satellites to gather information that will be helpful in deciding appropriate elk management. This capability enables the biologists to learn where elk migrate, gather, and feed. The collars have been sending signals to satellites every 23 hours from April 1996 to June 1998. The result is over 2500 "fixes" or data points.

This information will help predict population trends and elk movements and will provide some of the information necessary to develop management policies to reduce adverse impacts caused by elk coexisting with humans.

Fairy Slipper

Habitat management at the Laboratory—The species shown here are but a simple reminder of the world's natural beauty and our obligation to help preserve it. Proactive habitat management within Lab boundaries is an important part of Laboratory operations if we are to maintain the relatively undisturbed ecosystems that support species. "We are looking to develop a win/win situation here at the Laboratory," says Teralene Foxx, who works on the Lab's habitat management plan. "We want to protect those areas that are critical to species."

The Department of Energy has given the Laboratory three years to develop a habitat management plan, requiring one be in place by October 1998. Laboratory groups and collaborators from various organizations such as the US Geological Survey, the US Forest Service, and the New Mexico Natural Heritage Program, as well as independent wildlife consultants, have spent the first two years gathering information related to the locations of critical habitats, potential ecological risks, and possible effects of unnatural disturbance, such as excessive light or noise. In this final year, the Lab is formulating the plan, which must then be reviewed by the US Fish and Wildlife Service for its agreement.

Scarlet Lobelia

Bald Eagle

James Penstemon

Honey Mushroom

Pollutant Discharge Elimination System outfall permit expires, and we are working with the Environmental Protection Agency, the New Mexico Environment Department, and our stakeholders to develop a new permit.

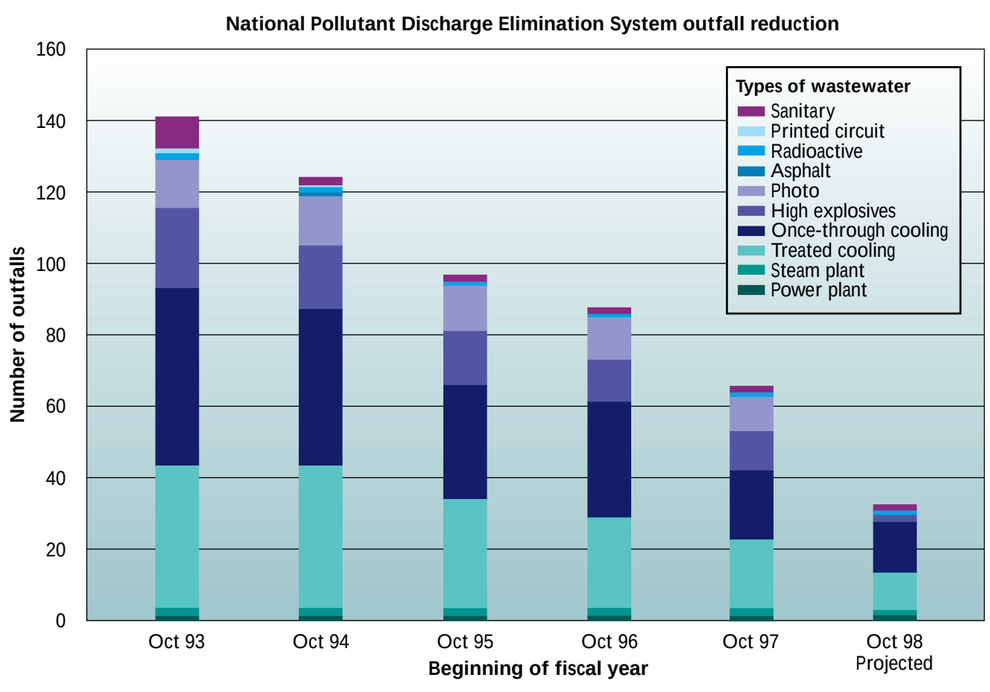
Ongoing monitoring of the area drinking water supply has shown its quality to be above that required by the Safe Drinking Water Act. (We work with the state scientific laboratory, which tests the water for organics, inorganics, and radioactivity.) We will continue additional monitoring of the water system to ensure water quality remains above requirements.

We are working on issues that concern the movement of radioactive sediments off Laboratory property and, in particular, the presence of very low levels of tritium in the main aquifer (see article, "There's Tritium in the Aquifer?" in this section of our report). One important issue identified by the Laboratory and the New Mexico Environment Department concerns the limited number of monitoring wells and inadequate characterization of subsurface water. In response, we are drilling additional monitoring wells and increasing groundwater testing.

Air quality

Our Laboratory has been monitoring air concentrations of plutonium, tritium, and uranium for over 25 years as part of its environmental protection program. (For more information about our air quality operations, see "For the Seventh Generation—Environment, Safety, and Health at Los Alamos National Laboratory: A Report to Our Communities," August 1997). This past year, we identified an improved method to measure airborne tritium. The method uses meteorological data concerning the total amount of water vapor in the air to derive a more accurate calculation than previously possible.

Traditionally, air quality data have been published in the Laboratory's annual environmental surveillance report. Recognizing the need for more complete and timely publication of radioactive air-emissions-monitoring information to meet increased public interest, we are now publishing data on the Web. The data come from the Laboratory's air monitoring network, AIRNET, 53 stations that monitor for airborne radionuclides. AIRNET's online address is **http://www.air-quality.lanl.gov/airnet.htm**.



Hazardous and solid waste

Part of our ongoing environmental management of the Laboratory involves cleanup and closure of waste sites. One of these sites, Material Disposal Area P, was a disposal site for Laboratory high-explosives work from the 1950s to 1984. The majority of the disposed materials are noncombustible debris from the burning of high explosives, high-explosive contaminated equipment, building materials, empty drums, chemical bottles, asbestos, and trash. The site encompasses approximately two acres, and the waste is approximately 12–14 feet deep. Approximately 30,000 cubic yards of debris are being excavated. In another project, the TA-49 Bottle House, workers donned personal protective equipment and used shovels and barrels to remove contaminated soil.

Natural resources management

In other activities that respond to our principle of respecting and caring for the environment, we are proud of the success of our Interagency Wildfire Management team. The team won a Pollution Prevention Award from the Albuquerque Chamber of Commerce for their work thinning along the fuel break on Highway 502, the western boundary of the Laboratory.

Our Laboratory has also developed the first Department of Energy Mitigation Action Plan. The plan addresses environmental impacts resulting from the construction of the Dual-Axis Radiographic Hydrotest Facility. (An article about the Mexican spotted owl further explains some of the activities that we are undertaking to protect the environment while expanding our facilities.)

More about environmental safety

Laboratory environmental experts are working to protect the environment. In 1997, environmental activities included work in habitat management, including elk and spotted owl studies and foodstuffs monitoring. One subject of growing interest to the public is tritium in our aquifer. An article later in this section about the aquifer explains how this material comes to be in our water.

■ Check the Web at **http://lib-www.lanl. gov/pubs/Environment.htm** for environmental reports including our annual report, Environmental Surveillance at Los Alamos, or contact our Community Involvement Office at (505) 665-4400 or 1-800-508-4400.

What Are We Eating?

My name is Hector Hinojosa, and I work at Los Alamos National Laboratory as a writer and editor. Born and raised in Los Alamos, I have grown to appreciate the wilderness that surrounds this area. I remember family campouts almost every weekend in the summer. I would daydream about what life must have been like in the previous century. I'd imagine spending weeks in the wilderness with nothing but the clothes on my back, a sturdy hunting knife, and a means for fire.

Hector Hinojosa

Today, I greatly admire those who know more about wilderness survival—about finding food from what nature provides. However, I can't help wondering if I should have concerns about hunting and gathering close to the Laboratory. After all, the Lab works with a lot of substances that might contaminate vegetation and wildlife.

Phil Fresquez

I decided to discuss this concern with another native of northern New Mexico—someone who routinely looks for contaminants in local foodstuffs—Phil Fresquez, team leader of the Contaminant Monitoring Program here at the Laboratory.

Phil, many of us here in northern New Mexico grow our own fruits and vegetables. We buy from local farmers and honey producers. We put meat on the table by hunting and fishing. Some of us even harvest native foods.

Yes, lots of people around here enjoy these activities—including me. There's a wide diversity of native food products in the area, and as part of our program, we collect all kinds of wild edible plants and fruits—berries, piñon nuts, herbs for teas and medicines, rhubarb, acorns, and much more.

Are we poisoning ourselves by harvesting these things near a laboratory that works with radioactive substances and heavy metals? Don't we end up with these substances in what we eat?

For the most part, we haven't detected significant amounts of radionuclides or heavy metals above natural levels—even though there are many historic waste sites within the Laboratory, most of them are behind fences, and the waste is usually buried. Contaminant amounts that are released—inadvertently—are so minute that they don't really impact the food chain.

You tell me this, but how can we be sure that the Lab is truly keeping these contaminants at bay?

Because of our Environmental Surveillance Program, a Department of Energy mandate that's implemented by the Laboratory. My team's mission is to make sure that the Laboratory is maintaining our commitment to environmental stewardship.

How do you do it?

Each year we analyze a wide variety of foodstuffs—deer and elk, fish, eggs, milk, wild teas, piñon nuts, honey, produce, domestic animals. Most samples are collected from neighboring areas and compared with samples collected miles away. We can then compare the different results by focusing on levels of contaminants in three areas: soils, foodstuffs, and plants and animals. We estimate radiation doses to the public from them and track trends over time.

How does all that help me know that the elk I bagged in Garcia Canyon is safe to eat?

You can check the Laboratory's environmental surveillance report. The latest issue, for example, shows that radionuclides found in elk collected from around here are similar to levels found in elk

Each year the Contaminant Monitoring Team analyzes a variety of foodstuffs from wild berries to large mammals to domestic crops. Many times local farmers contact Phil to ask for an analysis—a request he is happy to oblige.

collected a great distance away and are within the range of naturally occurring levels found throughout the Colorado Plateau.

That's good news, Phil, but is that all of it? You're not finding any contamination in the food chain from Laboratory operations?

Well, in the past we have detected some contaminants, particularly tritium, in samples collected from Laboratory areas. Recently, we have detected higher-than-background amounts of a variety of radionuclides in wild edible plants in Mortandad Canyon. However, the doses are far below federal limits. Also—and this is the good news—in the twenty-some years of soil surveys around the Laboratory, we're definitely seeing decreasing trends over time.

Really? Why do you think that is?

Well, the combination of better engineering controls, stricter emissions standards, waste remediation, and citizen awareness and activism is resulting in a better environment.

There's Tritium in the Aquifer?

Living on the southern end of the Rocky Mountains, northern New Mexicans know the meaning of the phrase "pure Rocky Mountain spring water." We can relate to that phrase and appreciate the coolness and the clean taste of our tap water. And we may rightfully become concerned when we hear that our tap water isn't as pure as we think it should be.

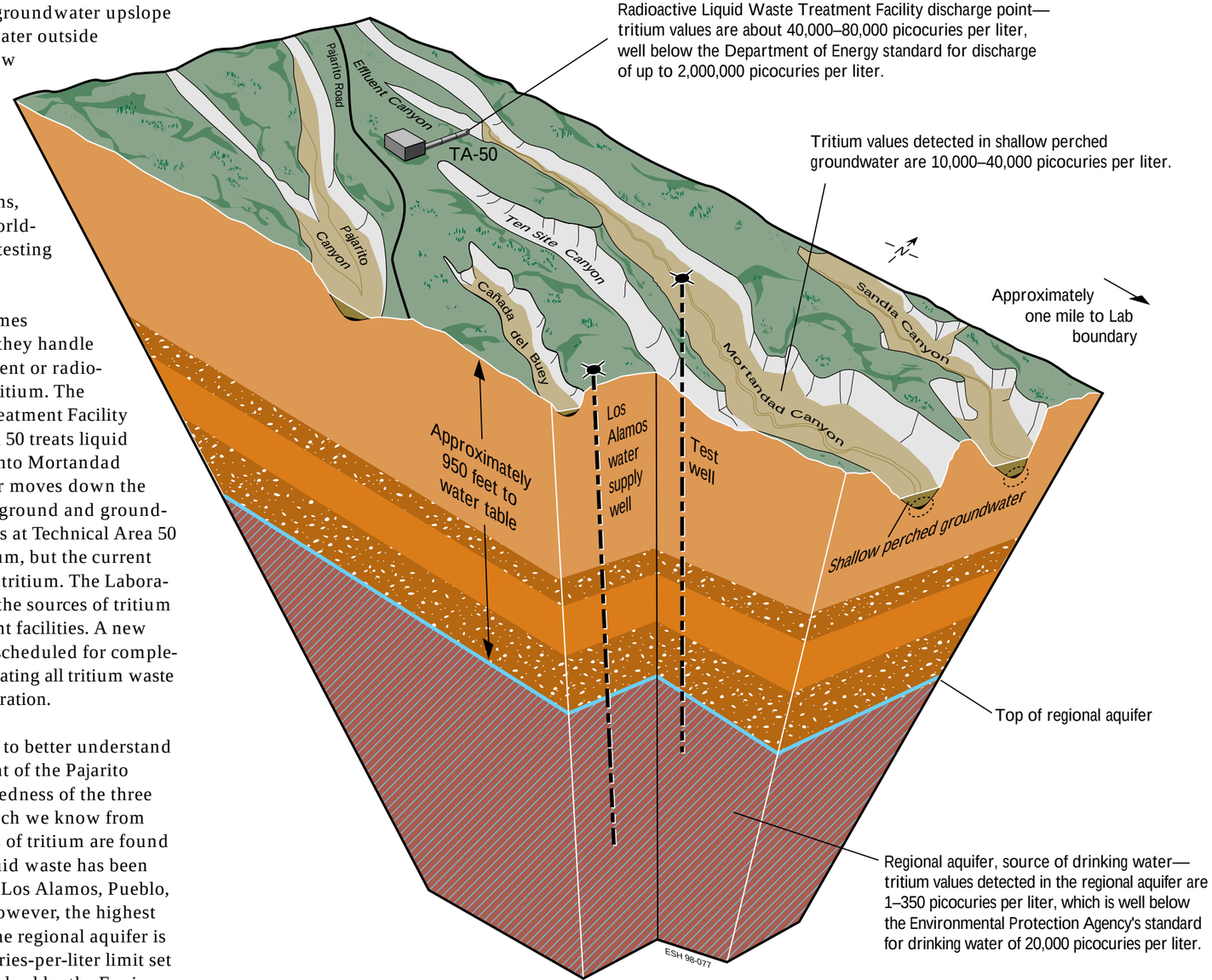
In December 1997, the Laboratory reported finding a trace amount of tritium in a perched groundwater zone—one of many small discontinuous zones—beneath the Pajarito Plateau. Most of us are probably not familiar with what tritium is, or for that matter, what an aquifer is. Others of us may be curious about how tritium is getting into groundwater and how much is harmful to the human body.

An aquifer is a water-saturated layer of sand, gravel, or bedrock below the ground surface that can supply usable quantities of groundwater to wells and springs (see illustration on the right). The Pajarito Plateau has three zones of groundwater—at different depths —which are not strongly interconnected. The shallowest perched groundwater is found near the surface of the canyon floor. ("Perched" means separated by low-permeability rock from other water-bearing layers.) At deeper levels, other perched zones form small pockets of groundwater. The regional aquifer—the drinking water source that is approximately 950 feet below the surface—is the deepest.

Tritium is a radioactive isotope of hydrogen with a half-life of 12.5 years. It is naturally produced in the atmosphere when cosmic rays strike atoms and molecules. The Environmental Protection Agency standard for safe levels of tritium in our drinking water is 20,000 picocuries of tritium per liter of water. (A curie is a unit used to measure radioactivity related to the rate of nuclear disintegrations, and pico means one trillionth.) Measurements of tritium in shallow groundwater upslope of the Laboratory—that is, water outside Laboratory boundaries—show background levels of 50 picocuries of tritium per liter. This small amount of tritium comes from rainfall containing natural tritium, tritium from Lab air emissions, and tritium left over from worldwide above-ground nuclear testing that ended in the 1960s.

Laboratory scientists sometimes generate liquid waste when they handle radiation-producing equipment or radioactive materials, including tritium. The Radioactive Liquid Waste Treatment Facility at Laboratory Technical Area 50 treats liquid waste before discharging it into Mortandad Canyon. As the treated water moves down the canyon, some seeps into the ground and groundwater. The treatment facilities at Technical Area 50 remove over 90% of plutonium, but the current technology does not remove tritium. The Laboratory is continuing to reduce the sources of tritium entering the current treatment facilities. A new facility at Technical Area 53 scheduled for completion in 1999 calls for consolidating all tritium waste streams for disposal by evaporation.

Our researchers are working to better understand the hydrological environment of the Pajarito Plateau and the interconnectedness of the three groundwater zones. This much we know from their studies—trace amounts of tritium are found in some test wells where liquid waste has been discharged, notably beneath Los Alamos, Pueblo, and Mortandad Canyons. However, the highest detected level of tritium in the regional aquifer is only 2% of the 20,000-picocuries-per-liter limit set as a safe drinking water standard by the Environmental Protection Agency.



This cross section illustrates the different strata in the Pajarito Plateau.

Progress in Environmental Safety

Progress in Outreach

In 1957, the Laboratory took down the gates that restricted access to our facilities. These gates symbolized something very basic to Lab culture—secrecy. From the very beginning of Project Manhattan, the project that led to the development of weapons that helped end World War II, our science and technology work required us to maintain secrecy based on issues of the national defense. Today, much of our work is unclassified—work not of a secret nature that responds to diverse national needs. Breaking through the secrecy culture has taken time, but 1997 was a year in which breakthroughs occurred, some of them based on citizen activism. John C. Browne, our new Director, has stated his commitment to maintaining a dialogue with the public about the Laboratory's work and its potential for impacting our environment, safety, and health.

Our Laboratory's responsibilities regarding issues of environment, safety, and health are fundamental to our relationship with our surrounding communities, our stakeholders, and the nation we serve. It is therefore not surprising that we are expending an increasing amount of effort to communicate with the public with information about environment, safety, and health issues and that we listen to public concerns. This outreach takes many forms: scientists teach and mentor students of all ages, Laboratory officials meet with stakeholders, and we distribute printed and electronic information about our operations to the public.

In this section of our report, three articles illustrate Lab outreach efforts. Read the story about our Hazardous Materials Team (HAZMAT). The team works with New Mexico communities in both HAZMAT training and in emergency response. In another form of outreach—

Dennis Erickson

"We are committed to continuing (our) community environmental meetings. We are always happy to tell people about our work, and we value the opportunity to hear first hand about the environmental concerns of our neighbors."

local economic development—we tell the story of Coyote Engineering, in which the successful transfer of a Laboratory technology will help environmental restoration, not just here in New Mexico, but around the country. An article about cooperation between our Laboratory and surrounding Pueblos provides one example of how we all deal with stakeholder issues concerning possible contamination from our operations.

The University of California, our prime contractor, is also involved in outreach. Roger Strelow, chair of the University of California President's Council Panel on Environment, Safety, and Health, has written a letter that appears in this section. In the letter he explains the work of the panel and how it interacts with the Lab and Lab stakeholders.

Citizen activism has also played a role in determining the nature of Laboratory outreach efforts. In 1994, the Santa Fe–based organization, Concerned Citizens for Nuclear Safety, sued the Department of Energy and former Laboratory Director Sig Hecker for noncompliance with the Clean Air Act. A consent decree filed on March 25, 1997, named three community outreach items that the Laboratory agreed to undertake with the following results:

• In 1997, we initiated and held four community environmental meetings: two in Santa Fe, one in Los Alamos, and one at San Ildefonso Pueblo. At these meetings members of the Laboratory's environment, safety, and health technical staff were available to discuss environmental issues with the public. The meetings included an environmental forum and presentations about water quality, Los Alamos cancer rates, and environmental restoration projects.

• Last year former Laboratory Director Sig Hecker met with Concerned Citizens for Nuclear Safety to hear concerns and suggestions regarding the protection of employees from retaliation or harassment for voicing environmental concerns and regarding the Concerned Citizen's own environmental concerns. In this meeting, the Director agreed to examine a possible model for resolving whistle-blower complaints.

• The University of California President's Council Panel on Environment, Safety, and Health met in 1997 and 1998 in Los Alamos. To arrange the first meeting, Laboratory Director Sig Hecker asked the panel to allocate one day during its visit to hear about Laboratory environmental issues. The Laboratory invited Los Alamos employees, Concerned Citizens for Nuclear Safety, and members of the public to attend.

Our environment, safety, and health outreach is extending far beyond the bounds of a decree to a spirit of voluntary cooperation with the public. As Dennis Erickson, Environment, Safety, and Health Division director, says, "We are committed to continuing (our) community environmental meetings. We are always happy to tell people about our work, and we value the opportunity to hear first hand about the environmental concerns of our neighbors."

To respond to public interest and provide an interface with our public, we established a Community Involvement and Outreach Office in August 1995. This office is a primary gateway for information and assistance that moves between the Laboratory and the public. In addition to answering public

Barbara Grimes (far right) of the Community Involvement Office works with some Native American students attending a Lab educational program.

inquiries, maintaining outreach centers, and organizing public meetings to make Lab employees and information more accessible, the Office also is involved in fostering positive relationships with local businesses, governments, and tribal populations. The Office seeks to match Laboratory resources with those needed by the citizens of northern New Mexico, whether they involve technical expertise to solve local problems or mentors to help students in the areas of mathematics and science.

■ The Community Involvement and Outreach Office can be contacted at (505) 665-4400 or 1-800-508-4400.

Barbara Grimes, of the Community Involvement and Outreach Office, has worked as an American Indian program coordinator at the Lab for eight years. One of her roles is to act as a point of contact for American Indian issues related to education and employment both inside and outside of the Lab. This contact has helped her learn what resources the Lab has to offer tribal communities and individuals.

Barbara takes a very personal approach in dealing with American Indian employees, including students. She says that when summer students are nurtured, they are more likely to go on and complete their education, which means they may eventually be able to become full-time employees.

Barbara also serves as a point of contact for tribal and community members who need information about Laboratory educational outreach and employment opportunities. Over time, she says she's seen a change in how the Lab and tribal organizations interact, with both groups more willing to interact cooperatively. Barbara is also currently a member of the Lab's Native American Diversity Working Group and the new Tribal Relations Working Group.

From Laboratory Technology to Economic Development

Bill Laughlin is very enthusiastic about his job at Coyote Mining and Environmental Instruments, Inc., in Los Alamos. Every morning he arrives at his office by 6:00 A.M. and spends the first quiet minutes of the day staring at a giant white board facing his desk.

Bill Laughlin

"Every day I think of a possible new application for this technology. It's very exciting!"

"Every day I think of a possible new application for this technology. It's very exciting," says Laughlin. The technology he's referring to is a laser-induced breakdown spectroscopy (LIBS) instrument, one of the most advanced methods of real-time contamination analysis. In a matter of seconds, a LIBS instrument can analyze and evaluate the metal content or the toxic contamination level in any material.

The LIBS instrument was first developed by Lab scientist David Cremers. In 1994, a cooperative research and development agreement between the Laboratory and ICF Kaiser Engineers, Inc., focused on LIBS applications in the mining and environmental restoration industries. At that time, Bill Laughlin worked for ICF Kaiser, and he remembers how excited he was when he began to think of the unlimited possibilities of LIBS. In 1997, Laughlin left ICF Kaiser to form Coyote Mining with Charles Mansfield. Later that year another cooperative research and development agreement between Coyote Mining and the Laboratory continued LIBS research and development.

The LIBS instrument consists of two components: a light-weight analysis head that houses a small laser and a detector unit. Laughlin demonstrates LIBS with a small sample of nontoxic beryllium silicate. After aiming the analysis head at the sample of beryllium silicate, Laughlin fires the laser. The laser forms a spark that excites the elements that make up the beryllium silicate. A fiber-optic cable then transmits the light from the spark to the detector unit, where a spectrograph identifies and quantifies the beryllium in the sample.

The LIBS instrument has great potential for the environmental restoration industry. LIBS can be used before, during, and after remediation. LIBS can be used to determine the types of contaminants at a site before cleanup begins, to monitor activities during remediation, and to verify that all contaminants have been safely removed after remediation is complete. The instrument is small enough to be fitted into a backpack and carried into the field for real-time use, saving remediation teams time and money by not having them wait months for laboratory test results.

Right now, Coyote Mining is using the LIBS instrument to court several outside industries. A number of glass companies in Ohio are looking to analyze raw materials and glass cullets for possible contaminants. A beryllium mining company in Utah would like to use a LIBS instrument to monitor the grade of beryllium ores in their mine.

"LIBS can also be used in diamond exploration," says Laughlin. The LIBS instrument's real-time analysis can spot diamond-indicator minerals such as garnets, pyroxenes, ilmenite, spinels, and olivine. Such minerals are usually found close to diamond ores.

Photos from top to bottom:

In a split second, a LIBS instrument can analyze the mineral makeup of this rock. Such a LIBS instrument could be used to help miners spot diamond-indicator minerals.

Bill Laughlin, one of the founders of Coyote Mining and Environmental Instruments, Inc., demonstrates the LIBS instrument.

The LIBS instrument is lightweight and easily portable on a backpack frame that makes it perfect for real-time use in the field.

Laughlin's enthusiam about his job and the LIBS instrument is contagious. With all the potential applications of LIBS, it is possible that Coyote Mining may begin manufacturing a number of LIBS instruments for commercial sales. Every time the Lab originates a technology that evolves into a local industry, it's good for the community. It's one way that we can share our technology, our people, and our resources with northern New Mexico.

Science and Engineering Associates, Inc., of Albuquerque is another company benefiting from the LIBS instrument. Recently, the company teamed with Lab researchers to use the LIBS instrument to analyze beryllium contamination at a site in Luckey, Ohio. The Luckey site was home to the Brush Beryllium Company and was placed on the Department of Energy's list of sites requiring cleanup. The Brush Beryllium Company operated a beryllium manufacturing plant for the Atomic Energy Commission during the early 1950s.

Two versions of the LIBS instrument, a backpack unit and a van-mounted unit, are currently in use at the Luckey site. The backpack unit, with the laser in a "walking stick" arrangement, is being used to gain access to more heavily foliated and uneven terrain. The van-mounted unit, which is not as transportable to remote areas, is more sensitive, being used to evaluate soil samples below the detection limit of the backpack. It is also being used to evaluate highly contaminated areas to minimize personnel exposure.

Cultures Connect: Water Monitoring on American Indian Pueblo Lands

"Real and potential impact to surface and groundwater from past, present, and future Laboratory operations is one of the most important issues to nearby Indian Pueblos. Specifically, the Pueblos' concerns relate to unknown potential impacts on their health and on natural and cultural resources, as well as on the water itself that has spiritual Pueblo use and significance."

—Gil Suazo

Los Alamos National Laboratory is a highly technical institution located within lands rich in Native American culture—to the southwest is Jemez Pueblo, directly to the east along the Rio Grande is San Ildefonso Pueblo, to the northeast is Santa Clara Pueblo, and to the south is Cochiti Pueblo. Among the many challenges faced by the Lab and our surrounding Pueblo communities is that each understands and respects the other's cultural values.

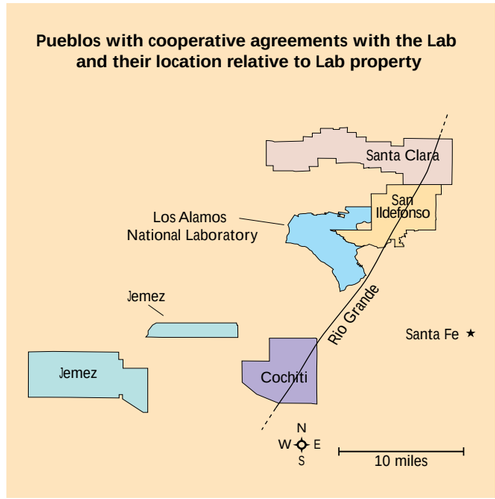
Gil Suazo

As one of the consequences of our scientific work, small amounts of radionuclides have traveled beyond Lab boundaries to Pueblo lands. Most of these wastes are from legacy operations conducted during the early years of the Lab. From a scientific perspective, the off-site contamination resulting from these radionuclides, which we monitor, is under limits considered safe and "acceptable" by federal laws and regulations. Nevertheless, we do recognize the value of minimizing exposure to all such substances. We respond to the issue of the presence of radionuclides and their movement from the Lab by setting up Lab environmental monitoring programs to collect data from both Laboratory and Pueblo lands.

Many Native Americans, however, approach environmental issues from a different cultural perspective. The idea that radionuclides are below "acceptable levels" or below worldwide radioactive fallout levels may not offer any comfort. Any presence of radionuclides is cause for concern. "Real and potential impact to surface and groundwater from past, present, and future Laboratory operations is one of the most important issues to nearby Indian Pueblos. Specifically, the Pueblos' concerns relate to unknown potential impacts on their health and on natural and cultural resources, as well as on the water itself that has spiritual Pueblo use and significance," says Gil Suazo, the Laboratory's advisor on tribal relations.

To help address the problem of cross-cultural differences, and as part of Accord Agreements with the Pueblos of Cochiti, Jemez, Santa Clara, and San Ildefonso, the Department of Energy has assisted in developing tribal environment departments. These environment departments are providing a means for the Pueblos to perform their own assessments of Laboratory impacts on their lands—to do their own sampling and to be able to compare their results with Laboratory results. According to Suazo, "It's important for the Laboratory to understand Pueblo concerns about potential impacts on their physical and cultural life. Pueblo-Laboratory Cooperative Agreements establish a mechanism for collaborative efforts to arrive at resolution on these issues."

Ken Mullen, a Laboratory scientist who works closely with the Pueblos, is involved in the environmental monitoring effort: "I find working with the Pueblos very satisfying—it makes my job



personal. The people I work with have honest concerns. It's good to talk to them directly about the data because they're interested. They really want to understand the full impact of the Laboratory's operations on their land."

By working together on environmental monitoring issues, both cultures have the opportunity to achieve understanding and mutual respect for differing views on technical issues associated with the Laboratory. Working closely with the Pueblos has given the Laboratory an opportunity to approach environmental work from a broader perspective that considers different cultural values.

Cooperation in solving environmental problems is a big challenge. The solutions to these problems are not simple, but as Laboratory scientists and Pueblo governments work together and learn to cooperate in monitoring and data collection programs, they will develop strong people-to-people networks.

Photos clockwise from top to bottom:

Randy Lujan, Max Maes, and Jeremy Rodriquez of the Laboratory and Peter "Boomer" Martinez of San Ildefonso Pueblo measure field parameters and label bottles at the Pueblo's New Community Well.

Lynn Miller of the US Geological Survey, a consultant to San Ildefonso Pueblo, collects data at Basalt Spring for later split sample analyses.

Randy Lujan and Jeremy Rodriquez, Laboratory summer students, fill sample bottles at Basalt Spring for water analysis.

The HAZMAT Challenge

Volunteer teams can make reservations to compete in the annual New Mexico HAZMAT Challenge, says Dave Volz, the man behind the Lab's Hazardous Materials (HAZMAT) Training Center. The Challenge, which began as a competition held on the last day of the Lab's HAZMAT summer training program, has expanded to include teams throughout the state.

"The Challenge gives us the chance to develop and share skills and professional camaraderie with our neighbors," says Bill Flor, HAZMAT group leader. "If we're called to help out somewhere in the state, then we know the people we are working with and they know us. We don't have to ask each other, 'Who are you and what training do you have?' We can get right to work together to resolve the problem."

Working together is one reason behind the Annual New Mexico HAZMAT Challenge. The first time it was held was on a beautiful northern New Mexico day, marred only slightly by the threat of early afternoon thunderstorms. The teams went through their introductory briefings, took a familiarization tour of the training stations, competed in four events during the morning, broke for a picnic lunch, made the final push through the "tie-breaker" obstacle course, and finally relaxed at the awarding of the traveling trophy.

Four teams competed in the 1997 Challenge: two Intel HAZMAT teams, Gallup Fire and Rescue, and the Lab's HAZMAT Team. The Gallup Fire and Rescue team won the Challenge by a single point. Seventeen agencies are planning for the 1998 Challenge.

Photos from right to left, top to bottom:

Intel competitors indulge in a little team spirit after finishing the obstacle course. "They did really well and were happy about it," said Dave Volz.

Two HAZMAT Challenge contestants take on an obstacle course task: using a hand pump to transfer liquid from a 55-gallon drum into a bucket while wearing full personal protective clothing.

Frances Millhouse from Intel enters the confined-space training module.

1997 winners, (left to right in the back row) Brent Mowrer, NoDee Lujan, Neal Eastridge, and Robert Soto. In the front row are Paul Muñoz, Robert Garcia (evaluator), and Mike Lovato (fire chief). All are with Gallup Fire and Rescue.

HAZMAT Training Center—Dave Volz (shown above and below working on training center equipment) has been the creative force for developing the HAZMAT Training Center. "We started a HAZMAT team 10 years ago at the Lab," says Volz. "First we had a trailer, then an actual vehicle. Then we expanded."

"The training center is shared by several groups at the Lab," says Volz, who started out by going to the former "excess" office at the Lab to acquire equipment. Through Lab salvage and lists of surplus equipment at other government agencies, Volz and others acquired fuel tankers, car fuel tanks, a chlorine station, and even a railroad car. He also helped to "create" equipment like the training "valve tree" by piecing together piping, valves, and other salvage material.

For training purposes, tanks and containers are filled with water and pressurized air. A one-ton chlorine container is used to practice responding to chlorine leaks—a fairly common hazard in local communities. The HAZMAT team also goes to communities from Gallup to Las Cruces to provide on-site training, such as chlorine emergency response classes.

The Embudo response—"A positive result of our interagency cooperation is that communities become aware of what Los Alamos can do to assist in a hazardous materials situation," says Bill Flor, HAZMAT group leader. "We had such a situation on September16, 1997, at Embudo, a community along the Rio Grande south of Taos."

That day, a gasoline tanker overturned at Embudo and spilled 7000 gallons of gasoline onto the side of the highway. After considerable efforts from Pojoaque and other volunteer fire departments, Los Alamos was called to join in the response effort because some of the fire department and public safety professionals at the scene knew of the specialized equipment and expertise that Los Alamos could add.

Upon arriving at the scene, the Los Alamos team constructed a hydrocarbon-absorbent boom and placed it across the Rio Grande to guard against the possibility that gasoline would go downstream. They also used absorbent pads to remove gasoline from pools on the ground. The team monitored surrounding structures for flammable gasoline vapors and helped with the hazard assessment of tons of contaminated dirt that was being removed.

"It was a long day," said HAZMAT team member Stanley Simmonds. "We arrived home at 2 A.M., but we were glad that we were able to help."

Photos on right, top to bottom:

A gasoline tanker after it overturned near Embudo on September 16, 1997. The Pojoaque Volunteer Fire Department (in yellow protective clothing) responded to the incident. Later, the Los Alamos Fire Department and Los Alamos HAZMAT team were asked to help.

The Lab's Darrin Stafford and two Department of Public Safety officers carry a boom made of hydrocarbon-absorbent material to the Rio Grande. If gasoline had leaked into the Rio Grande (it didn't), the boom would have absorbed the gasoline, which floats on the surface of water.

■ INFO NOTE

The summer HAZMAT training schedule is available on the web at **http://drambuie.lanl.gov/~esh10/ta49/**; also available is information about the training center props and photos from the 1997 Challenge. For more information, please e-mail the group at **esh_10@lanl.gov** or call the Hazardous Materials Response Group Office at (505) 665-5237.

Hearing the Voice of the Public—The University of California in Los Alamos

Roger Strelow, chair of the ES&H Panel of the President's Council on the National Laboratories, is Managing Principal for Strategic Environmental Management at Dames & Moore, a leading global consulting and engineering firm. He has served previously as a presidentially appointed Assistant Administrator of the US Environmental Protection Agency, as Vice President for Corporate Environmental Programs at General Electric, and as a partner in two major law firms. He is a graduate of the University of California Law School at Berkeley.

In overseeing the three national laboratories for which the University of California is responsible—Los Alamos, Livermore, and Berkeley—the University President regularly seeks advice from his Council on the National Laboratories. I chair the Council's Panel on Environment, Safety, and Health (ES&H), which typically reviews Los Alamos ES&H issues at each of four quarterly meetings. One of these is a two-day meeting at Los Alamos National Laboratory.

During 1997, the Panel focused largely on two issues: ES&H excellence and effective outreach to stakeholders. The Council and the President accepted our Panel's recommendation that the three laboratories commit to excellence in ES&H just as they have long been committed to excellence in research and development. "Excellence" in an ES&H context means that insofar as is feasible and beneficial, the laboratories perform better than the minimum requirements of the laws and regulations that apply to their operations.

A prime example of commitment to ES&H excellence exists at Los Alamos. The Laboratory's new beryllium facility is designed to hold worker beryllium exposures to roughly 25% of the level allowed by occupational standards. With the Panel's strong support, Los Alamos also enables their workers who may be sensitive to beryllium to obtain appropriate tests. On the basis of these tests, a worker may choose to avoid further exposure.

Our Panel is also involved in Laboratory outreach to stakeholders, regularly meeting with interested employees, community members, and other groups during its annual visit to the Laboratory. The University's Northern New Mexico Office, located in Los Alamos, also meets with stakeholders on a continuing basis. During the Panel's full day of meetings at Los Alamos last summer, we heard a recommendation that the Laboratory implement an employee whistleblower program. The Panel asked the Laboratory Director to consider this recommendation, and it is now being taken into account in a pending proposal for revising the Los Alamos Employee Complaint Policy.

In the future, the Panel will continue to review ES&H issues at Los Alamos National Laboratory and to provide constructive advice to the Laboratory Director, ES&H Division Director, and others.

Roger Strelow

Sandra Martinez and Christina Armijo (on left) answer questions for two visitors to the University of California's New Mexico Office in Los Alamos.

The University of California in Los Alamos—Chances are if you attend a community event in northern New Mexico, you'll see Christina Armijo and Sandra Martinez at a booth set up to represent the University of California. With Sandra's assistance, Christina manages the University of California's Northern New Mexico Office, which is located in Los Alamos at 1350 Central Avenue, Suite 101, near the Bradbury Science Museum.

As part of the University of California's outreach to communities, these two women distribute information about Los Alamos National Laboratory. One of the things they like about attending community events is that they have the opportunity to talk with people and to get feedback about the University's and Laboratory's roles in the region.

Among the objectives of the Office are support of regional economic development activities and oversight of the Laboratory's regional community programs.

■ The University of California's Northern New Mexico Office can be contacted by e-mail at **ucop@lanl.gov** or by phone at (505) 667-3232 or at 1-800-985-7232.

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page 20: RN98090009, RN98090015
page 28: RN98158020
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back inside cover: RN94085006

Illustration identification numbers:
page 3: 97-082
page 4: 98-150, 98-152
page 10: 98-154
Page 13: 98-149
page 16: 98-151
page 31: 98-164